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| EXAMINER | |
|---|---|
| PROCTOR, JASON SCOTT | |
| **ART UNIT** | **PAPER NUMBER** |
| 2123 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/993,715 | KUDO ET AL. | |
| | Examiner | Art Unit | |
| | Jason Proctor | 2123 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *2,10,11,13,22,23 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,10,11,13,22,23 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/24/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

Claims 2, 5-8, 10, 11, 13, 15, 16, 22, 23, 25, and 26 were rejected in the Office Action of 25 September 2006.

Applicants' submission on 18 December 2006 has cancelled claims 5-8, 15, 16, and 25; and amended claims 2, 13, 22, 23, and 26. Claims 2, 10, 11, 13, 22, 23, and 26 are pending in this application.

Claims 2, 10, 11, 13, 22, 23, and 26 are rejected.

### *Restriction/Election*

1. Applicant's election without traverse of Group I, claims 1-26 in the reply filed on 5 December 2005 is acknowledged.

### *Claim Objections*

2. Claim 13 is objected to because of the following informalities:

Claim 13 recites "a remote monitoring unit that remotely monitors the production state and the physical distribution state of the facilities..." which lacks clear antecedent basis. Although the claim defines "an actual completed workshop constructed according to the model of the virtual workshop," where the virtual workshop has a production state, a physical distribution state, and various facilities, the claim does not expressly specify that the actual completed workshop comprises these element.

Claim 13 recites "a virtual workshop, which is to be newly constructed, stored in the computer" which does not accurately reflect what is believed to be Applicants' invention. The Examiner understands the "virtual workshop" to represent "an actual workshop, which is to be newly constructed," and the "virtual workshop" is "stored in a computer". The claim language, however, suggests that the virtual workshop "is to be newly constructed" and is also "stored in the computer".

The language of claim 13 is unclear because the language appears to alternate between an apparatus and method style of claim. Where a claim sets forth an apparatus component (*a simulating unit*) that performs a function (*that receives settings... and utilizes the information stored in the computer to simulate...*), but then switches to passive voice (*production state, including production of the virtual roller bearings, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual roller bearings on layouts* ***is monitored***) the scope of the claim must be called into question. It is unclear whether the scope of the claims requires that a **simulating unit monitors** the production state, etc., or, as the claim language apparently implies, it is sufficient that the production state, etc., "is monitored" by any means or unit.

Claims 22 and 26 are objectionable for similar rationale based upon the similar claim language.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The previous rejections under 35 U.S.C. § 112 have been withdrawn in response to Applicants' amendments to the claims.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2, 10, and 11 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites:

"storing

information concerning structures of various rolling bearing production facilities and physical distribution facilities, which are to be newly established in a portion of newly established or existing workshops,

information concerning structures of existing portions of those workshops, which are to be kept in existence, or

information concerning structures of various rolling bearing production facilities and physical distribution facilities to be newly established in a newly established workshop designed newly in whole"

This language describes storing at least one of three types of information. The second type, "information concerning structures of existing portions of [newly established or existing] workshops," makes no requirement for "various facilities."

Claim 2 subsequently makes several references to "the various facilities" which are indefinite because "various facilities" are not absolutely required by the claim by virtue of storing information of the second type. Therefore, the steps of "storing information concerning functions of the various facilities," "storing information concerning control devices of the various facilities," "storing information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities," "storing information concerning operating conditions and layouts of the various facilities of the workshop," and "the rolling bearing production state and the physical distribution state on the layouts that have been simulated" are indefinite.

Claim 2 recites "storing settings of adjustment conditions and operating conditions" which renders the claim vague and indefinite. It is unclear if these limitations refer to "storing information concerning configurations and information concerning adjustment conditions necessary to adjust the rolling bearing production facilities and the physical distribution facilities" and "storing information concerning operating conditions and layouts of the various facilities of the workshop" or if they establish new "adjustment conditions" and "operating conditions."

If they refer back to the previously recited language, it is unclear what limitation they define because both recitations merely "store" the conditions. If they create new limitations, it is unclear to what they refer.

Claim 2 recites "simulating rolling bearing production state, including production of the virtual rolling bearings, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual roller bearings on the layouts is monitored" which renders the claim vague and indefinite. It is unclear whether this language defines a step of "simulating" or a step of "monitoring". It is unclear what must be shown in the prior art in order to teach or suggest this limitation.

Claim 2 recites "verifying the virtual workshop by adjusting the information and settings stored in the computer so that the simulated productivity is optimized" which renders the claim vague and indefinite. The Examiner respectfully submits that "verifying" is a separate and distinct concept from "optimizing," however this claim language appears to equate the terminology. Further, Applicants' remarks (18 December 2006, page 8) refers to page 6 of the specification for support for this language. Page 6 does not clearly describe optimization. The scope of the claim language is unclear because it is unknown what aspect of "simulated productivity is optimized," for example production rate, production cost, turn around time, percentage scrap, material cost, operating cost, capital expenditure, etc., and it is further unclear whether this optimization is supported by specification under 35 U.S.C. § 112, first paragraph.

It is unclear what must be shown in the prior art in order to teach or suggest the claimed feature of "verifying the virtual workshop by adjusting the information and settings stored in the computer so that the simulated productivity is optimized".

4. Claim 10 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 recites the limitation "the workshop deployment process" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

5. Claim 13 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites "wherein the virtual workshop is verified by adjusting the information and settings stored in the computer so that the simulated productivity is optimized" which renders the claim vague and indefinite for the reasons set forth above regarding similar language in claim 2.

Applicants' remarks (18 December 2006, page 8) refers to page 6 of the specification for support for this language. Page 6 does not clearly describe optimization. The scope of the claim language is unclear because it is unknown what aspect of "simulated productivity is optimized," for example production rate, production cost, turn around time, percentage scrap, material cost, operating cost, capital expenditure, etc., and it is further unclear whether this optimization is supported by specification under 35 U.S.C. § 112, first paragraph.

The claim language continues by specifying "wherein the virtual workshop is verified by adjusting the information and settings stored in the computer so that the simulated productivity is

optimized." This language appears to describe a method step, however it is unclear if the **simulating unit** is required to perform this step within the scope of the claimed invention.

Claim 13 recites "a remote monitoring unit ... compares the rolling bearing production state and physical distribution state on the layout in the actual completed workshop with the rolling bearing production state and distribution state on the layouts that have been simulated by the simulating unit" which renders the claim vague and indefinite. It is unclear from the claim language whether any simulation of the rolling bearing production state and distribution state on the layouts is performed by the invention.

The Examiner respectfully suggests that the form of this and other claims would be greatly improved by explicit and direct recitations of what components are required by the scope of invention, and an explicit and direct description of those components.

6. Claims 22-23 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22 recites "wherein the simulating means verifies the virtual workshop by altering the adjustment conditions and operating conditions so that the simulated production state and physical distribution state on the layouts is optimized when a modular unit of the production facility is interchanged" which renders the claim vague and indefinite. This language appears to imply at least three steps (simulating, optimizing, and interchanging) however the language does not expressly describe these steps.

It is unclear from the language whether interchanging a modular unit is required by the scope of the claim language (***when*** *a modular unit of the production facility is interchanged*). In other words, it is unclear whether the claim encompasses subject matter wherein there is no step of interchanging, thus there is no step of optimizing or verifying.

Applicants' remarks (18 December 2006, page 8) refers to page 6 of the specification for support for this language. Page 6 does not clearly describe optimization. The scope of the claim language is unclear because it is unknown what aspect of "simulated productivity is optimized," for example production rate, production cost, turn around time, percentage scrap, material cost, operating cost, capital expenditure, etc., and it is further unclear whether this optimization is supported by specification under 35 U.S.C. § 112, first paragraph.

As with claim 13, the language appears to be directed to method steps within an apparatus claim. This type of language obscures the metes and bounds of the claimed apparatus.

7. Claim 26 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 26 recites "wherein the simulating unit verifies the virtual workshop by altering the adjustment conditions and operating conditions so that the simulated production state and physical distribution state on the layouts is optimized when a modular unit of the production facility is interchanged" which renders the claim vague and indefinite. This language appears to imply at least three steps (simulating, optimizing, and interchanging) however the language does not expressly describe these steps.

It is unclear from the language whether interchanging a modular unit is required by the scope of the claim language (***when*** *a modular unit of the production facility is interchanged*). In other words, it is unclear whether the claim encompasses subject matter wherein there is no step of interchanging, thus there is no step of optimizing or verifying.

Applicants' remarks (18 December 2006, page 8) refers to page 6 of the specification for support for this language. Page 6 does not clearly describe optimization. The scope of the claim language is unclear because it is unknown what aspect of "simulated productivity is optimized," for example production rate, production cost, turn around time, percentage scrap, material cost, operating cost, capital expenditure, etc., and it is further unclear whether this optimization is supported by specification under 35 U.S.C. § 112, first paragraph.

Any claims rejected under 35 U.S.C. § 112, second paragraph, but not specifically mentioned stand rejected by virtue of their dependence.

***Response to Arguments – 35 USC § 103***

In response to the previous rejections under 35 U.S.C. § 103, Applicants argue primarily that:

> Griesmeyer does not discuss the step of storing information of a variety of production facilities but is only concerned with providing an optimal arrangement of an existing workshop space.

The Examiner respectfully traverses this argument as follows.

Applicants' claim language recites the terms *workshop, structures, production facilities, distribution facilities, functions, control devices, configurations, adjustment conditions, operating conditions, layouts, production state, virtual work in process, distribution state,* among

others. The claims have not explicitly and deliberately defined any of these terms. While some of these terms may be readily distinguished from each other, it is unclear what the precise metes and bounds of terms such as *workshop, facilities,* and *layouts* might be. Applicants' argument appears to distinguish between "production facilities," as claimed, where the prior art teaches an "arrangement of an existing workshop space." This distinction is unclear to the Examiner is not clearly supported by the claim language.

The specification of the application teaches that a "production facility" can be arranged in a plural number to define a "production line" (page 7, lines 15-25). Therefore it would be unreasonable to interpret the phrase "production facility" in the claims as meaning, for example, a separate workshop or manufacturing plant.

Griesmeyer teaches storing information of a variety of production facilities [*"Each of the assembly subsystems includes a robot, a set of grippers and appropriate algorithms for picking up various items on a pallet and placing them on other items to construct the desired assembly"* (page 2373, right column) and *"Configuration files tell the subsystem where items are initially on the pallets"* (page 2737, right column)]. An assembly subsystem is a *production facility* that produces *the desired assembly.*

Applicants further argue that:

> Barnes does not discuss that the structures of production facilities are stored. As recited later in claim 2, the storage of various production facilities allows for a simulated workshop to be optimized. Barnes only compares the manufacturing processes at an existing factory to the proposed manufacturing processes at another existing factory.

The Examiner respectfully traverses this argument as follows.

Barnes teaches that the structures of production facilities are stored [*"Machines such as 5-axis milling centers or processes such as aircraft joining are programmed to operate identically in the virtual environment as they would in the real environment. Design problems such as collisions, clearances, missing manufacturing features, fit, and manufacturing sequence issues are quickly identified."* (page 104, right column)]. Here Barnes clearly teaches storing, simulating, and optimizing the manufacture of an article using a 5-axis milling center.

It is unclear what portion of the claimed invention Barnes allegedly fails to teach by "compar[ing] the manufacturing processes at an existing factory to the proposed manufacturing processes at another existing factory." The Examiner submits that this language appears to teach at least the language "production facilities ... which **are to be newly established** (*proposed*) in a portion of **newly established or existing** workshop (*existing factory*)".

The claim language related to the phrase "optimized" or its conjugates has been rejected under 35 U.S.C. § 112, second paragraph, as set forth above.

Applicants' distinction between the claimed invention and the prior art is unclear.

Applicants further argue that:

> Jain also is concerned with the arrangement of subsystems in a factory, not with the overall design of a new factory.

The Examiner respectfully traverses this argument as follows.

The claim terminology does not recite the word "factory". It is unclear terminology in the claim is equivalent to "factory".

Applicants further argue that:

> Jain discusses a virtual factory having advanced decision support capability to rearrange components and business processes in the factory to ensure efficient operation of the factor... Jain does not discuss storing the structures of various facilities, only the one factory to mimic the real life operations of the factory.

The Examiner respectfully traverses this argument as follows.

The specification of the application teaches that a "production facility" can be arranged in a plural number to define a "production line" (page 7, lines 15-25). Therefore it would be unreasonable to interpret the phrase "production facility" in the claims as meaning, for example, a separate workshop or manufacturing plant, or in this case, factory.

Applicants further argue that:

> Further it is respectfully noted that section 3.1 of Jain, which was relied on by the Examiner, is a subsection of section 3 titled "Simulation Application in the Near Term Future." As such, it is respectfully submitted that as Jain is discussing concepts, rather than realized methods or apparatuses, this section of Jain should not be relied on for an obviousness rejection.

The Examiner respectfully traverses this argument as follows.

The Examiner agrees with Applicants' that the rejection relies upon the ***teachings*** of the prior art to form the basis of a rejection under 35 U.S.C. § 103. However, the Examiner does not understand 35 U.S.C. § 103 or the related case law to restrict the available prior art for an obviousness rejection to "realized methods or apparatuses," however those terms may be defined. Therefore, these rejections will not be withdrawn because they rely on the "concepts" taught by the prior art.

Applicants further argue that:

> The technical feature of claim 2 of storing information concerning structures of various production facilities and physical distribution facilities of an existing or newly established workshop having a portion or the whole that is newly designed provides a virtual workshop that has been modeled based on data and can verify a production state making verification of the workshop in its entirety simple. By this advanced verification, it is possible to reduce the facility costs and the stock advantageously.

The Examiner respectfully traverses this argument as follows.

The claims do not expressly specify any "advance verification" as referenced by Applicants' arguments. The claim language recites a step of *storing data*, and subsequently *verifying the virtual workshop by adjusting the information and settings stored in the computer so that the simulated productivity is optimized*, a phrase which has been rejected under 35 U.S.C. § 112, second paragraph, as being vague and indefinite. The prior art teaches simulation of a virtual manufacturing facility for the purposes of optimization, as shown below in the rejections under 35 U.S.C. § 103. If Applicants feel that novelty or non-obviousness may be found in the "advanced verification," the Examiner respectfully suggests that Applicants submit claim language that emphasizes the particular features of the "advanced verification" that distinguishes it from the prior art.

Applicants submit similar arguments regarding claims 10, 11, 13, 22, 23, and 26, which have been addressed above.

Applicants' arguments have been fully considered but have been found unpersuasive.

***Claim Rejections - 35 USC § 103***

The previous rejections under 35 U.S.C. § 103 have been withdrawn in response to the amendments to the claims specifically regarding the phrase "production facilities" being limited to "rolling bearing production facilities." A search of the prior art has revealed references which teach "rolling bearing production facilities." Accordingly, new grounds of rejection have been entered.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

8. Claims 2, 10, 11, 13, 22, 23, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over "Process Subsystem Architecture for Virtual Manufacturing Validation" by J. Michael Griesmeyer and Fred J. Oppel, III (Griesmeyer) in view of US Patent No. 6,332,265 to Tonooka.

Griesmeyer teaches a workshop facility designing method comprising a virtual workshop verifying process of formulating a virtual workshop that is a data model of an existing or newly established workshop ["a process subsystem control architecture that facilitates *virtual manufacturing validation* through the use of common control *software* to run *both the virtual and real subsystem.*" (abstract) See Figure 2 (page 2374) and Section 3.1.2 regarding the formulation of a virtual workshop.];

Regarding the step of storing several types of information, Griesmeyer clearly suggests to a person of ordinary skill in the art the act of storing the requisite information to conduct the simulation in a computer, such as *"In our approach, the production process consists of a series of parameterized process operations"* (page 2371, right column), and inherent or implicit in teachings such as *"Each of the assembly subsystems includes a robot, a set of grippers and appropriate algorithms for picking up various items on a pallet and placing them on other items to construct the desired assembly"* (page 2373, right column) and *"Configuration files tell the subsystem where items are initially on the pallets"* (page 2737, right column).

A simulating means that causes the virtual workshop to perform simulated production activity [Section 3.2 for an example of simulated production activity, such as "For example, to determine the 'pallet exists state' of the input port in the real environment requires the use of a proximity sensor to detect the arrival of the pallet. To determine the same state in the *virtual environment* requires the *simulation* to detect the arrival of the pallet utilizing collision routines. The virtual and real drivers generate the same type of state and event information."];

Virtual products are manufactured in the virtual workshop [*"Virtual validation of the assembly sequences for small electro-mechanical devices has been done through the use of the assembly subsystem control architecture described here."* (page 2375, right column)];

Production state, including production of the virtual products, production of virtual work in process, and distribution state, including flow of virtual work in process and flow of finished virtual products is monitored to thereby verify the virtual workshop [*"The virtual drivers for the assembly subsystem simulate the motion for all degrees of freedom in the system. This includes robot joint values, and gripper positions. The joint trajectory values are calculated using the routines available in the robot controller. Item locations are also modeled and are based on the attachment bookkeeping information..."* (page 2374, right column)];

A workshop development process of constructing an actual workshop including various layouts compatible with the virtual workshop so verified [Section 4, "The configuration files and the part tracking components of the assembly subsystem are verified together with the assembly sequence parameters using the virtual drivers to the primitives. Then, the *construction of the actual assemblies* are performed with the validated scripts using the real drivers."]

And a remote monitoring process of remote monitoring the production state and physical distribution state of the facilities in the layout employed in the actual workshop so constructed, and comparing the production state and the physical distribution state that have been monitored, with the productions state and the physical distribution state that have been simulated [Section 2.3, "The results of the *real primitive execution* need to be recorded and/or displayed to provide record of manufacture and feedback to the process development efforts. Results of the *virtual*

*execution* must also be displayed and recorded for purposes of *virtual manufacturing validation.*"].

Griesmeyer does not expressly disclose "rolling bearing production facilities."

Tonooka discloses rolling bearing production facilities (title, abstract, entire document).

Tonooka and Griesmeyer are analogous art because both are directed to manufacturing technology.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Griesmeyer and Tonooka to design and simulate a manufacturing workshop that produces rolling bearings with an enhanced rate of fit [*"it is an object of the invention to provide a rolling bearing manufacturing apparatus and method which can enhance the rate of fit of the rolling elements between the outer and inner races of the rolling bearing, thereby enhancing the efficiency of the rolling bearing manufacturing process."* (Tonooka, column 3, lines 52-59)]. Further, Griesmeyer is clearly directed toward the broader field of "virtual manufacturing," and it would be obvious to a person of ordinary skill in the art that a particular intended use is required to practice the invention, be it the manufacture of rolling bearings, springs, hinges, or any other suitable manufactured article.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2, 10, 11, 13, 22, 23, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over "Virtual Reality and Simulation" by Martin Barnes in view of "Simulation in the Next Millennium" by Sanjay Jain, and further in view of US Patent No. 6,332,265 to Tonooka.

Barnes teaches "Virtual Manufacturing", stating at pages 104-105, section 9.0 through 9.1, emphasis added:

> "In the applications described below, VR worlds have been created that are 3D and that realistically represent **existing or planned environments**. The VR world is animated with behavior **controlled by a simulation engine which uses simulated behavior rules and model data**...
>
> "Visualization allows the user **to assemble components in a Virtual Manufacturing cell**. This could be by utilizing the 3D models of the part designs using popular CAD packages... Sikorsky used Deneb's IGRIP simulation software **to recreate the actual manufacturing process**...
>
> **"Virtual Manufacturing modeling allows the user to introduce the engineering design to the processes that will be used to create the actual part, assembly, or installation**. The tool design is imported to the model, combined with the part and **dynamic representations of the machines that will produce the part. Machines** such as 5-axis milling centers **or processes** such as aircraft joining **are programmed to operate identically in the virtual environment as they would in the real environment... The ability to insert people in the environment and analyze their activities minimizes ergonomic problems.**

> **"Factory modeling allows engineers to predict the cost and schedule impact of potential design or process changes.** The discrete process modeling tool, **QUEST, is used by Sikorsky to model the impact of machine run times, set up times, resource constraints, part lot quantity, and many other factors to develop a simulation that mirrors the entire manufacturing process under review**... The model provides support personnel with **a tool to optimize the manufacturing process**, try new concepts without disruption manufacturing, and predict changes due to load variations... The graphical interface allows the manufacturing experts to **actively participate in validating the model.**

Barnes does not explicitly enumerate performing a maintenance operation or monitoring the actual workshop.

Jain teaches a "Virtual Factor", stating at pages 1481-1483, emphasis added, that:

"**A virtual factory is an integrated simulation model of major subsystems in a factory** that considers the factory as a whole and **provides an advanced decision support capability** (Jain et al. 1998). It mimicks the real life operations of the factory. **Realistic 3D visualization of the factory can be build in the virtual factory, if needed for example for visualizing a future green field factory.**

... With advancements in computing technology it is feasible to create a virtual factory, that models the major aspects of the factory in an integrated way... It is envisaged as a major capability that can support rapid development and efficient operation of manufacturing systems throughout the lifecycle.

**At the design stage, the virtual factory can be used to ensure that the manufacturing system and sub-system designs when implemented will meet the requirements...**

**At the installation stage, a virtual factory will be used to ensure that the equipment as built, installed and integrated meets the design and, in turn, the requirements. It is expected the virtual factory component models used for design stage validation will also be used to conduct installation stage validation through stepwise replacement of simulated components with physical components.**

The role of a virtual factory during operations becomes threefold. **First, it can serve to ensure that a validated manufacturing system continues to meet its requirements over prolonged periods of time. Second, the virtual factory can be used to support continuous improvement changes, which will go through a concept-design-installation cycle of their own.** Third, the virtual factory can be used as an application itself. For example, simulation based planning and scheduling solutions can be built using the virtual factory models.

Barnes and Jain are analogous art because both are drawn to simulation.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the monitoring and maintenance teachings of Jain with the virtual manufacturing teachings of Barnes.

Motivation to combine is found throughout the Jain reference, for example, "to support continuous improvement changes" (page 1483, left column, third paragraph).

Barnes in view of Jain does not expressly teach "rolling bearing production facilities".

Tonooka discloses rolling bearing production facilities (title, abstract, entire document).

Tonooka and Barnes in view of Jain are analogous art because both are directed to manufacturing technology.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Barnes in view of Jain and Tonooka to design and simulate a manufacturing workshop that produces rolling bearings with an enhanced rate of fit [*"it is an object of the invention to provide a rolling bearing manufacturing apparatus and method which can enhance the rate of fit of the rolling elements between the outer and inner races of the rolling bearing, thereby enhancing the efficiency of the rolling bearing manufacturing process."* (Tonooka, column 3, lines 52-59)]. Further, Barnes in view of Jain is clearly directed toward the broader field of "virtual manufacturing," and it would be obvious to a person of ordinary skill in the art that a particular intended use is required to practice the invention, be it the manufacture of rolling bearings, springs, hinges, or any other suitable manufactured article.

Therefore it would have been obvious to a person of ordinary skill in the art to combine the teachings of Barnes, Jain, and Tonooka to arrive at the invention specified in claims 2, 10, 11, 13, 22, 23, and 26.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR)

system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason Proctor
Examiner
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2/2/07